

held against the printed label frame the contact (53) contacts simultaneously the contact plate (41) on the electronic part.

The code reader (52) is connected to a hand computer and information transmitted from the hand computer to the electronic part adjusts the electronic part display (45). A verification that this has occurred is sent back as a signal to the hand computer for further transmission to the shop main computer in which the new information can now be stored.

ADVANTAGE - To overcome problems with known methods for remote-controlled adjustment of price information on shelf edge labels where there is a risk of disturbance, physically large equipment is used, and there is no two-way communication with verification.

Dwg.5/9

Title Terms: DEVICE; ELECTRONIC; PRICE; MARK; SHELF; EDGE; LABEL; LABEL; TEXT; PART; BAR; CODE; ELECTRONIC; PART; DIGITAL; ALPHANUMERIC; DISPLAY; PRICE; GOODS; INFORMATION

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Electronic price tag with wireless communication to control computer - has LCD force-plate with micro-chip circuitry behind to display price and description of product with power management scheme and wire bidirectional communication to control computer

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Abstract (Basic): RD 344094 A

The portable electronic price tag is able to run on solar panels (or a combination of solar and rechargeable battery power) and has two way wireless communication with the host computer. Independently power source and wireless communications are needed for the devices to be completely portable - easily moved with no installation wiring costs. A



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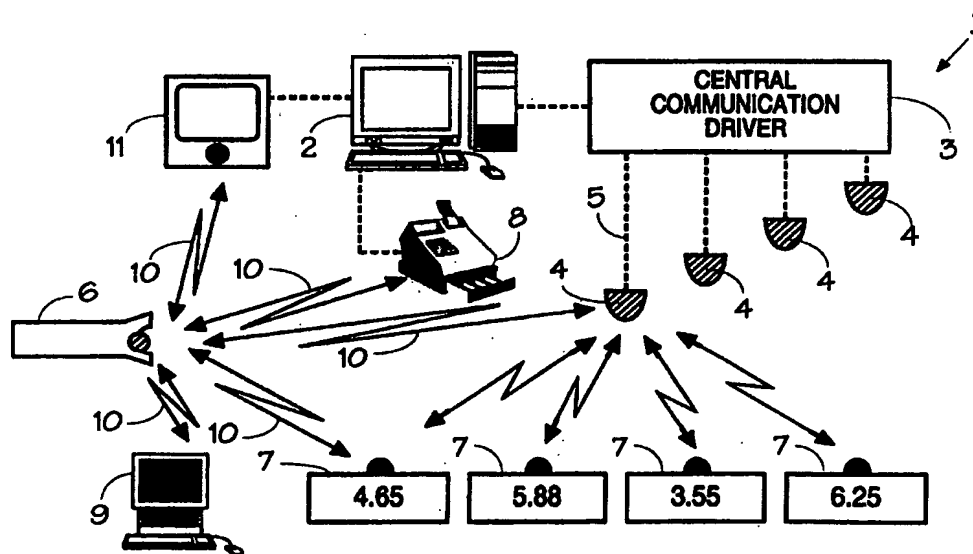
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(54) Title: PERSONAL SHOPPING SYSTEM



## (57) Abstract

A personal shopping system, including personal shopping devices (6) carried with customers during purchase and selectively communicating with the store computer (2) and a point of sale device (8). The system further includes a first storage device (55) assigned to each customer with information regarding the customer's shopping profile; and a second storage device (52) assigned to the customer, with information on special offers of reduced prices on selected items, the special offers generated by the store computer (2) in accordance with the contents of the first storage device (55).

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## PERSONAL SHOPPING SYSTEM

### FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to a personal shopping system, and in particular to such a system including a personal shopping device for identifying the customer's shopping profile.

Maintaining a customer shopping profile based on the customer's purchase history, and recording the current purchase contents, can serve a customer and the store in various ways:

- 1) It can aid the customer in preparing his shopping list, since the contents of past purchases is usually a good reminder for future purchases.
- 2) By comparing the current purchase contents with the shopping list, it is easy to detect and identify items which have been skipped unintentionally or are missing in the store, for reminding the customer to obtain these items at the same or another store.
- 3) Information on the purchase contents, with the aid of personal finance software, can be used by the customer to keep track of and control his expenses and personal budget.
- 4) Information on the shopping profile of a customer and /or his actual shopping list can aid the store in preparing customized special offers for the customer. This feature can be further enhanced by identifying the customer's location and providing him with special offers related to items which are both included in the customer's shopping profile/ shopping list and displayed in the current vicinity of the customer.
- 5) Information on the current purchase contents recorded during purchase as each item is selected and put in the shopping cart, can serve for "self-

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scanning" the shopping cart contents thus facilitating the checkout procedure.

A personal shopper with the features and advantages described above has not been found in the prior art. Prior art related to "self scanning" by consumers is implemented commercially as handheld bar-code scanners received at check-in and returned at the POS and is the subject of U.S. patents 5,457,307, 5,382,779, 5,361,871, and 5,345,071. Prior art relating to shopping list devices is described in U.S. patents 4,071,740, 5,047,614, 5,424,524 and 5,483,472. Electronic shelf labels, which form part of a preferred embodiment described below, are implemented commercially and are described in U.S. patents 4,002,886, 4,139,149, 4,521,677, 4,766,295, 5,019,811 and 5,313,569. Prior art related to location-dependent messages sent to store customers is described in U.S. patents 4,973,952, 5,287,266, 5,406,271.

#### OBJECT AND BRIEF SUMMARY OF THE INVENTION

It is a main object of the present invention to provide a personal shopping system and device offering consumers and merchants the features and advantages described above.

According to a preferred embodiment of the present invention, there is provided a personal shopping system for serving a customer visiting a store selling a plurality of items, including a store computer storing therein price information relating to each of the items;

at least one point of sale for collecting payment upon purchase completion, the point of sale communicating with the store computer;

a personal shopping device carried with the customer during purchase

and selectably communicating with the store computer and the point of sale;

a first storage device assigned to the customer, comprising information regarding the customer's shopping profile; and

a second storage device assigned to the customer, comprising information on special offers of reduced prices on selected items, the special offers generated by the store computer in accord to the contents of the first storage device.

In a preferred embodiment of the present invention, the first storage device forms part of the personal shopping device.

In an alternative embodiment, the first storage device forms part of the store computer and is identifiable and accessible through a customer's ID, and the personal shopping device further including a storage device for storing therein the customer's ID for identifying and accessing the first storage device therethrough.

According to another aspect of the present invention, the personal shopping device further includes a third storage device with shopping list information, and the personal shopping device preferably includes user interface means to display the shopping list information. Preferably, the user interface means is also operative to input the shopping list information, and also to mark part of the shopping list information relating to items already purchased, and to selectably display shopping list information relating to items not included in the marked part.

According to still another aspect of the present invention, the personal shopping device further includes a fourth storage device for recording the items purchased. According to another aspect, the personal shopping system of the present invention further includes data processor means to update the contents of the first storage device, in accord to the contents of the fourth storage device upon purchase completion.

The personal shopping system according to the present invention may preferably include also a plurality of electronic shelf labels communicating with the

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store computer, each assigned to a group of identical items and displaying the price thereof. Each of the electronic shelf labels in the vicinity of the personal shopping device preferably communicates with the personal shopping device for selectably changing the information displayed on the electronic shelf label in accord to signals received from the portable shopping device if addressed to this electronic shelf label. According to another aspect, the electronic shopping device, when aimed at a selected electronic shelf label, communicates with this electronic shelf label to receive therefrom the identity and price of the item to which this electronic shelf label is assigned, and the personal shopping device further comprises user interface means to input therethrough quantity information relating to the purchased amount of the item, to be stored in the fourth storage device. Then, preferably, upon purchase completion, the personal shopping device communicates with the point of sale to download thereto the contents of the fourth storage device, to provide "self scanning" of the purchase contents to facilitate the checkout procedure.

According to still another aspect of the present invention, the personal shopping device communicates with the store computer through short-range infrared communication with a plurality of fixed transceivers each linked to the store computer; the store computer further comprising information identifying the proximity of each of item and each of the fixed transceivers, and data processor means effective to generate special offers addressed to the personal shopping device in accord to the proximity of the items and the fixed transceivers currently communicating with the personal shopping device.

According to another aspect, the personal shopping system of Claim 8 further includes a personal computer communicating with the personal shopping device to upload therefrom the contents of the fourth storage device, for keeping record of purchases and expenses.

### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram of a preferred embodiment of a personal shopping system according to the present invention.

Fig. 2 is a schematic illustration of an electronic shelf label which forms part of the system of Fig. 1.

Fig. 3 is a schematic illustrations of a personal shopping device in accord to the present invention.

Fig. 4 is a schematic block diagram of the electronic shelf label of Fig. 2.

Fig. 5 is a schematic block diagram of the personal shopping devices of Fig. 3.

Fig. 6A is a schematic description of the contents of the customer's shopping profile.

Fig. 6B is a schematic description of the contents of the customer's shopping list.

Fig. 6C is a schematic description of the contents of the customer's special offers list.

Figs. 6D and 6E are schematic descriptions of the contents of the customer's shopping record, during purchase and upon purchase completion, respectively.

Fig. 7A is a flowchart of the main procedure of the operation of the present invention.

Figs. 7B-F are five flowcharts describing in detail the basic steps of the main procedure of Fig. 7A.

Fig. 8A is a block diagram describing a second preferred embodiment of the system of the present invention.

Fig. 8B is a schematic block diagram of the personal shopping device



which forms part of the system of Fig. 8A.

Fig. 8C is a flowchart describing the main procedure of the operation of the system of Fig. 8A.

Fig. 9A is a schematic block diagram of the personal shopping device according to a third preferred embodiment of the present invention.

Fig. 9B is a flowchart describing the main procedure of the operation of a system using the personal shopping device of Fig. 9A.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

#### The System According to a First Preferred Embodiment

Reference is now made to Fig. 1, describing a preferred embodiment of the personal shopping system 1 of the present invention. In a retail store, store computer 2 manages inventory and price information, and optionally also customer-related information such as customer identification or customer purchase profile. Store computer 2 communicates with one or more Points Of Sale (POS) units 8 to send thereto price information and receive therefrom sales information, and with one or more customer interfaces 11 placed in the store area, to send thereto personal messages to a customer or to receive therefrom customer identification or customer purchase profile. It also uses a central communication driver 3 and wires 5 to energize and control a backbone of infrared transceivers 4, preferably scattered over the store's ceiling, to communicate with a plurality of electronic shelf labels 7 for downloading price information thereto. Personal shopping device 6 of the present invention, personal to and carried with a customer, can communicate through a short-range infrared communication link 10 with POS 8, electronic shelf labels 7, customer interfaces 11, ceiling transceivers 4 and a personal computer 9, which is either a desktop model at the customer's home or a portable model carried with the customer.

Personal computer 9 is used to provide the customer with an alternative for more powerful computing and more convenient user interface than the computing and user interface included in the personal shopper. It may also run personal finance programs which use the shopping data acquired by the personal shopper of the present invention, for personal finance analysis and reports.

Customer interface 11, located conveniently at the store entrance (and possibly with additional units located throughout the store) and linked to the store computer 2, includes a display and a communication link to personal shopping devices 6. It serves the customer for communicating with the store computer, transmitting thereto the customer ID and/or the customer purchase profile and reading corresponding customized special offers generated by the store computer in return. Also, the display of customer interface 11 optionally serves the customer to conveniently read information stored within his portable shopping device, e.g. his shopping list with checkmarks beside items already picked. POS 8 communicates with personal shopping device 6, to identify the customer and the corresponding special offers which have been generated for him upon his visit to the store; if the store allows self scanning, POS 8 may retrieve from personal shopping device 6 the contents of the shopping cart.

Fig. 2 illustrates the appearance of an electronic shelf label 7, placed on the shelves next to items offered for sale. Housing 20 includes infrared transceiver 21 to communicate with store computer 2 through infrared transceivers 4, and with personal shopping devices 6. Display 22 shows price information of the related product, said product is also identified by sticker 23 to avoid confusion among adjacent merchandise items. Blinker 24 attracts the customer's attention to items in his shopping list and/or to special offers.

Fig. 3 illustrates the appearance of personal shopping device 6. Housing 32 accommodates infrared transceiver 30 and reflector 34 for communicating with

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electronic shelf labels 7, point of sale 8 and personal computer 9. Keypad 36 and display 33 allow the customer to enter and read information into and from personal shopping device 6, respectively. Blinker 35 provides additional signals to the customer, to attract his attention to items in his shopping list or special offers list; blinker 35 can optionally be accompanied or replaced by other attention catching signals, e.g. blinking of display 33, vibrations, or sound (not shown.)

The block diagram of Fig. 4 describes the main elements of the electronic shelf label 7 of Figs. 1 and 2. Screen 22 displays the price stored in price register 44. This price is downloaded from store computer 2 through communication link 46, which includes central communication driver 3 and ceiling transceivers 4 from Fig. 1 and received through wireless transceiver 21. The price update message is addressed to each individual electronic shelf label 7 according to the product ID stored in register 41. Product ID register 41 contains preferably the standard product code (UPC), and preferably also additional descriptive information such as the product's description (e.g. "ABC Low-Fat Milk") and product "family name" (e.g. "Milk".) Electronic shelf label 7 also communicates with personal shopping device 6 through short-range IR communication link 10, for uploading thereto identity information of the product from register 41. Blinker 24 attracts the customer's attention to items in his shopping list and/or to special offers, in response to signals including the product's identification 41 received from personal shopper 6. CPU 40 controls the operation of and information flow within the electronic shelf label 5. Power supply 45, preferably a battery, energizes the various components of electronic shelf label 7.

The block diagram of Fig. 5 describes the main elements of personal shopping device 6 of Figs. 1 and 3. Screen 33 displays information to the customer, typically shopping list information from register 54, product information received through communication with an electronic shelf label 7, special offers from register 52 or an echo of the information entered by the customer through keypad 36. Blinker 35 provides additional signals to the customer, to attract his attention to items in his

shopping list or special offers list. Keypad 36 is used for entering item count information during purchase for items whose identification is obtained through communication with the respective electronic shelf labels, or for entering shopping lists. Shopping list memory 54 includes a list of items that the customer wishes to purchase, as entered either through keypad 36, or through personal computer 9, at home or at the store prior to commencing the shopping. Special offers memory 52 includes information on special offers generated by store computer 2 in relation to the contents of shopping profile memory 55 and shopping list 54; such special offers are generated when personal shopping device 6 communicates with store computer 2 (Fig. 1) through either customer interface 11 or ceiling transceivers 4; the special offers in memory 52 are effective during purchase to trigger eye-catching signals from blinkers 24 of the respective electronic shelf labels approached by the customer, and as personal shopping device 6 is presented at POS 8 during checkout, for effectuating the reduced prices. Purchase record memory 51 includes the identification and quantity of each item already put in the shopping cart during the current visit to the store, updated during purchase through identifying purchased items by communicating with their respective electronic shelf labels 7 and entering their count through keypad 36. The contents of purchase record 51, when compared to the contents of shopping list 54, serves to generate a reminder of items skipped during purchase or missing in the store; in appropriate environments, it also serves to provide the POS with a "self scanned" list of the shopping cart contents, to accelerate the checkout procedure; and the contents of purchase record memory 51 serves CPU 50 and/or personal computer 9, in updating the contents of purchase profile memory 55. Customer shopping profile memory 55 includes the statistical information relating to items purchased by the customer in the past. This information is updated upon purchase completion, by adding the contents of the current purchase record 51. Alternatively, the contents of customer shopping profile memory 55 can be updated,

according to the contents of purchase record 51, during communication with personal computer 9, which may provide the customer with a convenient comprehensive control over the contents of customer shopping profile memory 55, to remove irrelevant data of exceptional, non-representative purchases, e.g. purchase made toward a birthday party. The contents of customer shopping profile memory 55 provides the customer with a baseline for preparing shopping lists; it also provides the store computer with a useful indication for generating customized special offers. External interfaces 56, preferably IR transceiver 30 of Fig. 3, serves personal shopping device 6 to communicate with shelf labels 7, POS 8, personal computer 9, ceiling transceivers 4 and customer interface 11.

Fig. 6A describes the contents of shopping profile memory 55 of Fig. 5. Each record (row) relates to one specific merchandise item, while each field (column) relates to a specific characteristic of said item: field 61 relates to the date of the last purchase of said item; field 62 is the cumulative number of units which have been purchased in the past; field 63 is a description of said item, while field 64 is a "family name" describing said item in general.

Fig. 6B describes the contents of shopping list memory 54 of Fig. 5. Each record (line) describes the family name 64 and quantity 65 of an item to be purchased.

Fig. 6C describes the contents of special offers memory 52 of Fig. 5. Each item is identified by its product code 66, description 63 and special, reduced price 67.

Fig. 6D describes the contents of purchase record memory 51 of Fig. 5 during purchase. As each item is put in the shopping cart, its code number 66, description 63, family name 64 and price 69 are acquired by communication between personal shopping device 6 and the corresponding electronic shelf label 4 (from registers 44 and 41 therein). The quantity 68 is keyed-in by the customer using keypad 36. By comparing the contents of the the purchase record of Fig. 6D with the contents of the shopping list of Fig. 6B, items which have been skipped by the customer or are

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missing in the store can be easily identified (e.g., in the current example "soap" has not been put in the shopping cart yet,) and can be displayed on screen 33 upon request.

Fig. 6E describes the purchase record at purchase completion. It is a more completed version of Fig. 6D, and includes items from the shopping list of Fig. 6B as well as additional items (e.g. "banana",) selected arbitrarily during purchase. The contents of the purchase record is used optionally as a "self scanned" list of items, to facilitate checkout; as a basis for updating the contents of the purchase profile memory (Fig. 6A); and as an input for a personal finance program at personal computer 9.

#### The Operation of the System According to the First Preferred Embodiment

Fig. 7A is a flowchart describing the main operational procedure of a preferred embodiment of the present invention. At block 70, the customer prepares his shopping list (Fig. 7B), either at home or in the store prior to commencing purchase. In block 71 store computer 2 generates special offers list 52 (Fig. 6C). In Block 72, the customer makes his shopping (Fig. 7D), while in block 73 the customer completes his checkout procedure (Fig. 7E). When returning home, the customer updates his personal finance program on personal computer 9 (Fig. 7F.) Then, the customer is ready for another shopping session, starting at block 70.

Fig. 7B is a flowchart describing the preparation of a shopping list by a customer (block 70 Fig. 7A; block 54 Fig. 5, and Fig. 6B.) This can be done at home using the built-in keypad and screen (36 and 33 of Figs. 3 and 5), or through communication with personal computer 9, which may be more convenient. Also, shopping list preparation can take place at the store prior to commencing purchase, possibly with the aid of customer interface 11. At block 76, shopping profile memory (Fig. 5 block 55, and Fig. 6A) is scanned to remove outdated items whose last purchase has been before a predetermined period, say 60 days (for instance, when a baby grows up thus baby products become irrelevant.) In block 77, the items from the updated shopping profile are displayed, preferably in a descending order of their

shopping frequency (62 in Fig. 6A), providing a useful reminder. The customer browses through the items, and marks selected items with a quantity number, which automatically transfers the "family name" 64 and the quantity number into the shopping list memory (54 of Fig. 5, and Fig. 6B.) In block 78, additional items, not in shopping profile memory 55, can be added to shopping list 54 by keying-in a family name and quantity.

Fig. 7C is a flowchart describing the generation of special offers list at the store entrance, prior to commencing shopping. For the following description see also Figs. 1 and 5. In block 81 the shopping profile and shopping list are read by store computer 2 from memories 55 and 52, respectively, through customer interface 11. In block 82, the special offers list is generated by store computer 2, taking into account the customer's shopping profile read from memory 55, his current shopping list read from memory 54, and the store preferences in granting discounts; thus the list of Fig. 6C may include items from the shopping profile 55 and shopping list 54, competing items (e.g. "LMN" coffee competing with "ABC" coffee from the profile), or additional items according to the store preference. In block 83 the special offers list is downloaded to personal shopping device 6 through customer interface 11, is stored in memory 52 and displayed on customer interface 11 and can be recalled at any moment to screen 33 of portable shopping device 6 by pressing the appropriate button on keypad 36.

Fig. 7D is a block diagram describing the shopping process according to a preferred embodiment of the present invention after special offers have been downloaded to shopping device 6 during check-in (block 85.) Reference is made hereinafter also to blocks from Figs. 1, 4 and 5. The procedures of blocks 86-89 are executed in any number and in any order, until purchase completion at 90, followed by the checkout procedure of Fig. 7E.

Block 86 relates to "self scanning" of items during purchase, for updating the contents of purchase record 51 as each item is removed from the shelf and put in the shopping cart. Shopping device 6 communicates with electronic shelf label 7, to acquire the identity of the respective product, including the product code, description, family name and price. Keypad 36 is used to key-in the quantity purchased, and screen 33 serves to display both the shopping list and the details of the purchased items.

Block 87 relates to the addition of more items to special offers list 52, on the initiative of store computer 2 and in accordance to the actual location of the customer. Addition of during-purchase, location-dependent special offers is advantageous as it provides the customer with relevant offers on time while avoiding an overloaded special offers list at entrance which may confuse the customer. As shopping device 6 communicates with one or more ceiling transceivers 4, the identity of the specific ceiling transceivers 4 currently communicating with shopping device 6 provides computer 2 with indication regarding the current location of the customer. By linking this information with the merchandise items located at the respective neighborhood and the contents of shopping profile 55 and shopping list 54, the store computer selects additional items relevant to the customer and his current location. These items are downloaded to special offers list 52 through ceiling transceivers 4, blinker 35 is actuated to attract the customer's attention, and the relevant items from the special offer list are displayed on screen 33.

Block 88 relates to receiving on-label data and reminders, relating to items in the shopping list and or special offers list, by displaying momentarily the special offer prices on screen 22 and receiving eye-catching signals from blinker 24 (Fig. 2.) Such data and signals are triggered by personal shopping device 6 transmitting product information from its shopping list 54 and special offers list 52 (see item 64 in Fig. 6B and items 66-67 in Fig. 6C.) Electronic shelf labels which find



matching information stored in their product identification register 41, respond with blinking signals and with the special price (if the item is in the special offers list), to provide the customer with useful guidance, reminder and data.

Block 89 relates to another sort of reminders, generated by personal shopper unit 6 under the initiative of store computer 2, by flashing screen 33, blinker 35 or additional signals such as vibrations or sound. Store computer 2 identified the current location of the customer through the identity of ceiling transceiver(s) 4 currently communicating with shopping device 6, and then the contents of the shelves in the current location, as mapped in the store computer, is compared with the contents of memories 52 and 54 uploaded to the store computer from the customer's unit. If matches are found, a message accompanied by an triggering an attention-catching signal in personal shopping device is sent from the store computer to the shopping device through ceiling transceivers 4, identifying the respective items to the customer as a useful reminder.

Fig. 7E is a flowchart describing the checkout procedure (block 73 of Fig. 7A.) As shopping is completed (block 92) the customer approaches a point of sale 8 and presents his personal shopping device 6 to account and pay for his purchase (block 93.) Personal shopping device 6 communicates with POS 8 to upload thereto the contents of its purchase record 51 and special offers list 52, and to receive therefrom the current time stamp to be included in updating the shopping profile (item 61 in Fig. 6A.) If the store permits self scanning and the customer is eligible for such service, the contents of purchase record 51 serves the POS to account for the purchase and collect payment without the need to unload and scan the contents of the shopping cart. In any case, the contents of the special offers list memory 52 serves to calculate the price of the items from this list according to the special offers. In block 94 the customer pays for his purchase. In block 95, upon purchase completion and upon

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signal received at shopping device 6 from either POS 8 or from the customer through keypad 36, CPU 50 updates shopping profile 55 by adding thereto the contents of shopping list memory 54 with the time stamp just received at the POS, and then it clears shopping list memory 54 and special offers list memory 52, which have become useless.

Fig. 7F is a flowchart describing the personal finance procedure 74 of Fig. 7A. As the customer approaches his personal computer 9 loaded with personal finance software, the personal computer interfaces with personal shopping device 6 to upload therefrom (block 97) the contents of purchase record memory 51. The contents (Fig. 6E) is processed by the personal finance software (block 98) for updating data and reports. In block 99 the purchase record memory 51 is reset as it is not useful anymore.

#### The System and its Operation According to a Second Preferred Embodiment

Figs. 8A-C relate to a second preferred embodiment, implementing only a subset of the functions of the first preferred embodiment. The main elements omitted are electronic shelf labels and ceiling transceivers and the associated functions of self scanning and during-purchase signals.

Fig. 8A is a block diagram describing the main elements of the system 1A of the invention according to the second preferred embodiment. Store computer 2 maintains inventory and price information, and is linked to at least one point of sale 8A which determines purchase contents, calculates its price and receives payment therefore. Personal shopping device 6A can communicate with the store computer 2 through one or more customer interfaces 11A, with points of sale 6A and with personal computer 9A.

Fig. 8B is a block diagram describing the main elements of shopping device 6A of Fig. 8A. Screen 33 displays information to the customer, typically shopping list information from register 54, special offers from register 52 or an echo of

the information entered by the customer through keypad 36. Keypad 36 is used for entering shopping lists and for marking elements in the shopping list already put in the shopping cart. Shopping list memory 54 includes a list of items that the customer wishes to purchase, as entered either through keypad 36, or through personal computer 9, at home or at the store prior to commencing the shopping. Special offers memory 52 includes information on special offers generated by store computer 2 in relation to the contents of shopping profile memory 55 and shopping list 54; such special offers are generated when personal shopping device 6 communicates with store computer 2 (Fig. 8A) through customer interface 11A; the special offers in memory 52 can be displayed on screen 33 or on customer interface 11A and are effective as personal shopping device 6 is presented at POS 8A during checkout, for effectuating the reduced prices. Purchase record memory 51 includes the identification and quantity of each purchased item and is received through communication with POS 8A upon purchase completion; the contents of purchase record memory 51 serves CPU 50 and/or personal computer 9, in updating the contents of purchase profile memory 55 and as an input for personal finance software on the personal computer. Customer shopping profile memory 55 includes the statistical information relating to items purchased by the customer in the past. This information is updated upon purchase completion, by adding the contents of the current purchase record 51. Alternatively, the contents of customer shopping profile memory 55 can be updated, according to the contents of purchase record 51, during communication with personal computer 9, which may provide the customer with a convenient comprehensive control over the contents of customer shopping profile memory 55, to remove irrelevant data of exceptional, non-representative purchases, e.g. purchase made toward a birthday party. The contents of customer shopping profile memory 55 provides the customer with a baseline for preparing shopping lists; it also provides the store computer with a useful indication for generating customized special offers. External interfaces 56A,

which can use contact or contactless techniques well known in the art, serves portable shopping device 6 to communicate with POS 8A, personal computer 9A and customer interface 11A.

Fig. 8C is a flowchart describing the operation of the system of Fig. 8A. In block 11, the customer prepares his shopping list, preferably by using keypad 36 and screen 33 (or, alternatively, personal computer 9A) to browse through shopping profile 55 (see also Fig. 6A) and enter the quantity to be purchased of each selected item. Additional items can be keyed-in as well. In block 111, personal shopping device 6A interfaces with store computer 2 through customer interface 11A, to generate a customized special offers list 52 according to the contents of shopping profile 55, shopping list 54 and the store's preferences. In block 112, shopping takes place, with the aid of the contents of shopping list 54 displayed on screen 33. Each purchased item put in the shopping cart can be marked or removed from the shopping list by keying-in through keypad 36, the unmarked or remaining items displayed as a useful reminder. At checkout (block 113) the customer unloads the shopping cart for conventional scanning. The personal shopping device 6A interfaces with POS for payment (block 114) in accord to the reduced prices in special offers list 52, and for updating the contents of purchase record 51 and shopping profile 55 (block 115.) In block 116 personal shopping device 6A interfaces with personal computer 9A, preferably at the customer's home, for updating his personal finance program.

#### The System and its Operation According to a Third Preferred Embodiment

Figs. 9A-B relate to a third preferred embodiment, similar to that of Figs. 8A-C, but with the shopping device lacking a keypad and display and the shopping profile is maintained at the store computer rather than in the personal shopping device.

Fig. 9A describes the personal unit 6B, similar to that of Fig. 8B, but

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lacking keypad and display. Instead of shopping profile memory 55, personal unit 6B has a customer ID register 59, including identification information unique to each customer. Store computer 2B includes in 150 the normal functions of the store computer 2 of Figs. 2 and 8A, and in addition, a plurality of shopping profile memories 55B, each assigned to a specific customer identified by the contents of customer identification register 59.

Fig. 9B described the operation of the system of the invention according to the embodiment of Fig. 9A. In block 120, the customer interfaces his personal shopping device 6B with personal computer 9B and generates a shopping list 54. In block 121, upon arrival to the store the customer interfaces his shopping device 6B with the store computer 2B through a customer interface 11B, to generate a special offers list; in preparing this special offers list, store computer 2B takes into account the contents of shopping list 54 as well as the contents of the customer's personal shopping profile 55B, stored at the store computer and accessed through customer's ID 59. The special offers list is stored either at special offers list memory 52, or at another memory assigned to the customer at the store computer (not shown), and is displayed to the customer on customer interface 11B. In 122 the customer carries out his shopping, and can approach from time to time a customer interface 11B to review his shopping list and/or special offers list. In block 123 the customer approaches a POS for scanning and payment; he interfaces his personal shopping device to identify himself, to receive the reduced prices of his special offers list (upon payment at block 124), to update the contents of the respective shopping profile memory 55B, and to download the content of the actual purchase into purchase record memory 51 (block 125). In block 126 the customer interfaces his personal shopping device 6B with personal computer 9B, to upload thereto the contents of the purchase from purchase record memory 51 for completing the personal finance procedure.

WHAT IS CLAIMED IS:

1. A personal shopping system for serving a customer visiting a store selling a plurality of items, comprising:
  - a store computer storing therein price information relating to each of said items;
  - at least one point of sale for collecting payment upon purchase completion, said point of sale communicating with said store computer;
  - a personal shopping device carried with said customer during purchase and selectably communicating with said store computer and said point of sale;
  - a first storage device assigned to said customer, comprising information regarding said customer's shopping profile; and
  - a second storage device assigned to said customer, comprising information on special offers of reduced prices on selected items, said special offers generated by said store computer in accord to the contents of said first storage device.
2. The personal shopping system of Claim 1, wherein said first storage device forms part of said personal shopping device.
3. The personal shopping system of Claim 1, wherein said first storage device forms part of said store computer and is identifiable and accessible through a customer's ID, and said personal shopping device further comprising a storage device for storing therein said customer's ID.
4. The personal shopping system of Claim 1, wherein said personal shopping device further comprising a third storage device with shopping list information.

5. The personal shopping system of Claim 4, wherein said personal shopping device further comprising user interface means to display said shopping list information.

6. The personal shopping system of Claim 5, wherein said user interface means is further operative to input said shopping list information.

7. The personal shopping system of Claim 5, wherein said user interface means is further operative to mark part of said shopping list information relating to items already purchased, and to selectably display shopping list information relating to items not included in the marked part.

8. The personal shopping system of Claim 1, wherein said personal shopping device further comprises a fourth storage device for recording the items purchased.

9. The personal shopping system of Claim 8, further comprising data processor means to update the contents of said first storage device, in accord to the contents of said fourth storage device upon purchase completion.

10. The personal shopping system of Claim 1, further comprising a plurality of electronic shelf labels communicating with said store computer, each assigned to a group of identical ones of said plurality of items and displaying the price thereof.

11. The personal shopping system of Claim 10, wherein each of said

electronic shelf labels in the vicinity of said personal shopping device communicates with said personal shopping device for selectably changing the information displayed on said electronic shelf label in accord to signals received from said portable shopping device if addressed to said electronic shelf label.

12. The personal shopping system of Claim 10, wherein said personal shopping device further comprises a fourth storage device for recording the items purchased;

said personal shopping device, when aimed at a selected one of said electronic shelf labels, communicates with said selected electronic shelf label to receive therefrom the identity of the item to which said selected electronic shelf label is assigned;

said personal shopping device further comprises user interface means to input therethrough quantity information relating to the purchased amount of said item;

said identity and said quantity information being stored in said fourth storage device.

13. The personal shopping system of Claim 12, wherein, upon purchase completion, said personal shopping device communicates with said point of sale to download thereto the contents of said fourth storage device.

14. The personal shopping system of Claim 1, wherein said personal shopping device communicates with said store computer through short-range infrared communication with a plurality of fixed transceivers each linked to said store computer;

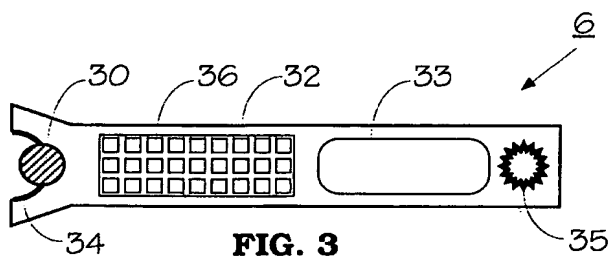
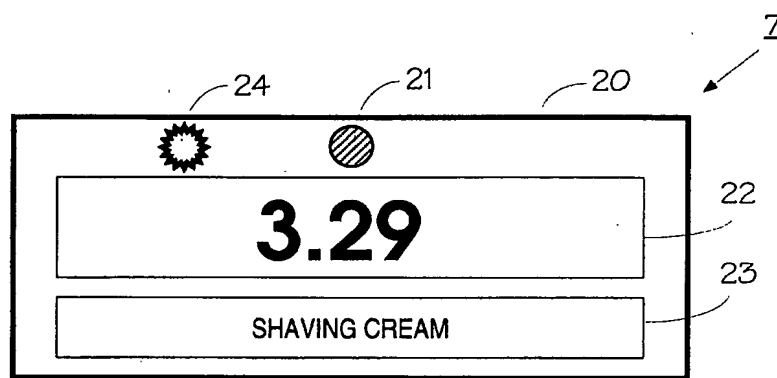
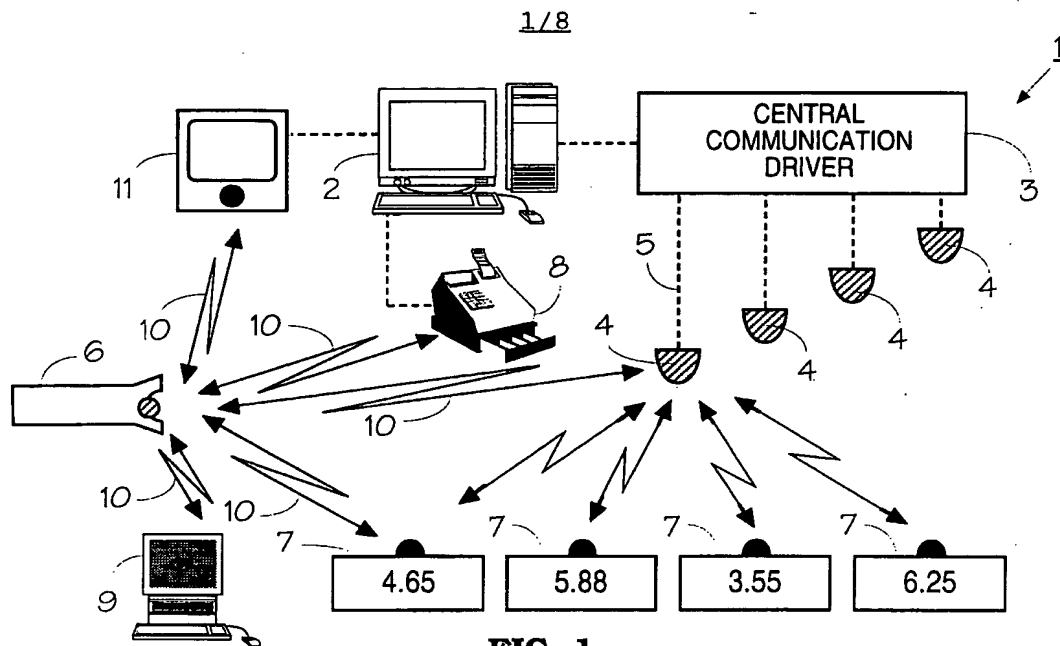
said store computer further comprising information identifying the proximity of each of said plurality of items and each of said fixed transceivers, and data processor means effective to generate special offers addressed to said personal



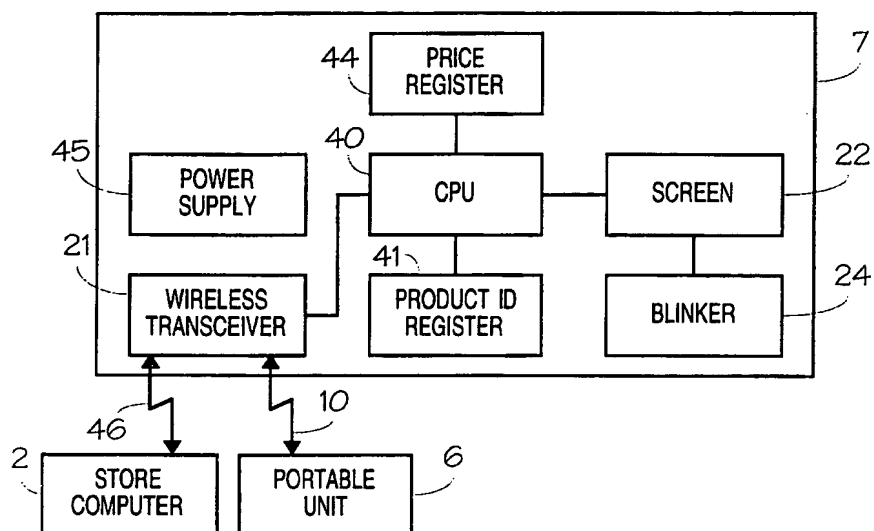
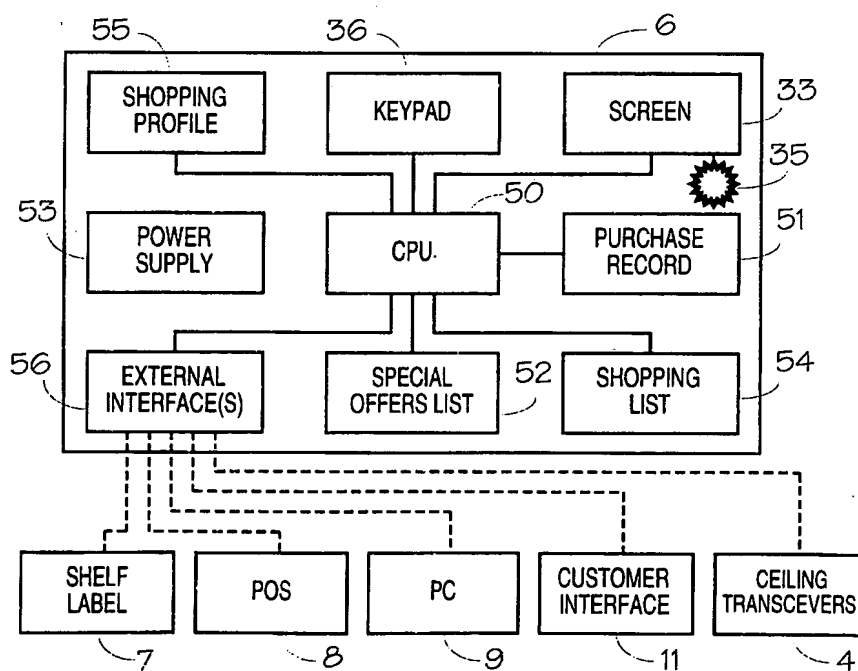
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shopping device in accord to the proximity of said items and the fixed transceivers currently communicating with said personal shopping device.

15. The personal shopping system of Claim 8, further comprising a personal computer communicating with said personal shopping device to upload therefrom the contents of said fourth storage device.



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**FIG. 4****FIG. 5**

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61	62	63	64
7/30	255	"CROWN" BREAD	BREAD
7/30	225	"ABC" LOW-FAT MILK	MILK
6/25	220	"JIMMY" JUICE	JUICE
7/27	103	"VV" YOGURT	YOGURT
6/27	17	"CBA" COFFEE	COFFEE
7/30	15	"XYZ" LIQUID SOAP	SOAP
6/12	10	"ZYX" CAT FOOD	PET FOOD
...	...	.....	.....

FIG. 6A

64	65
BREAD	1
MILK	2
SOAP	4
...	...

FIG. 6B

66	63	67
123412	"CROWN" BREAD	1.30
234516	"ABC" LOW-FAT MILK	2.15
981234	"LMN" COFFEE	3.95
...	...	....

FIG. 6C

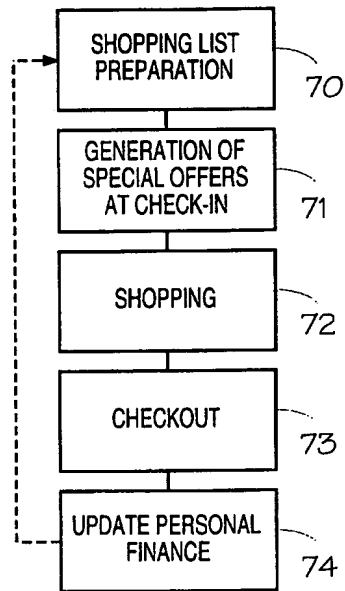
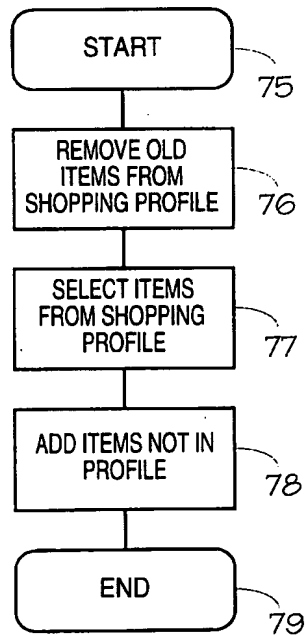
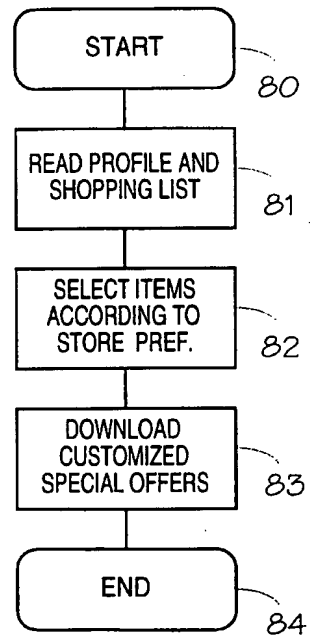
66	63	64	68	69
123412	"CROWN" BREAD	BREAD	1	1.30
234516	"ABC" LOW-FAT MILK	MILK	2	2.15

FIG. 6D

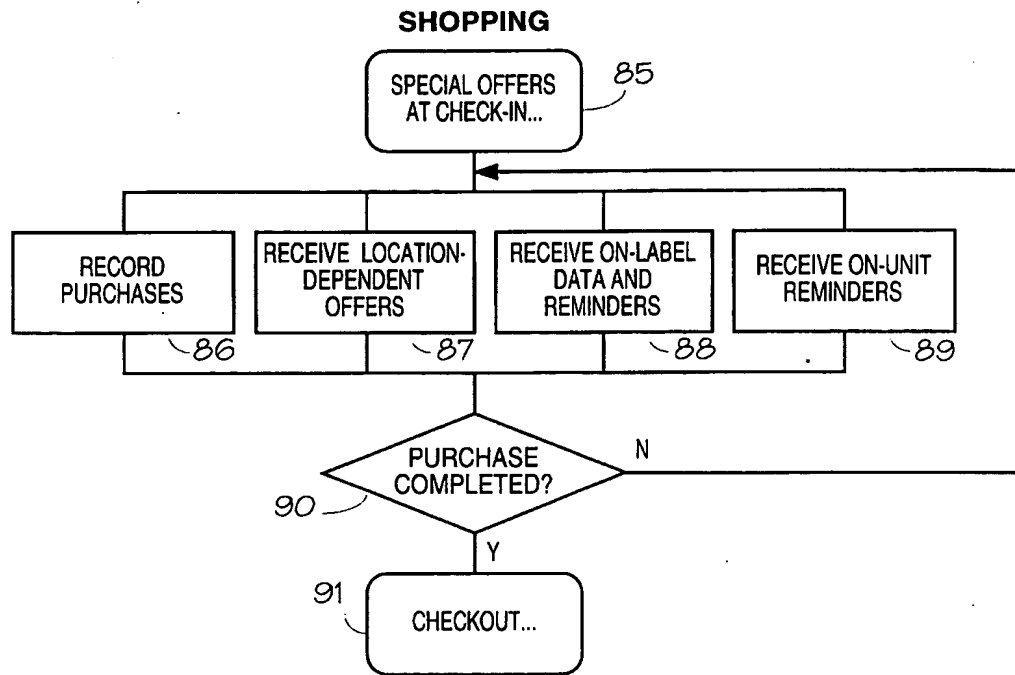
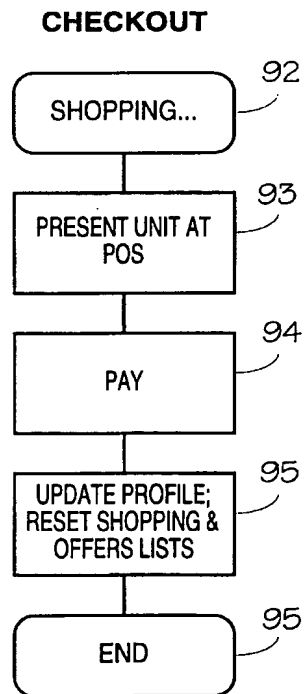
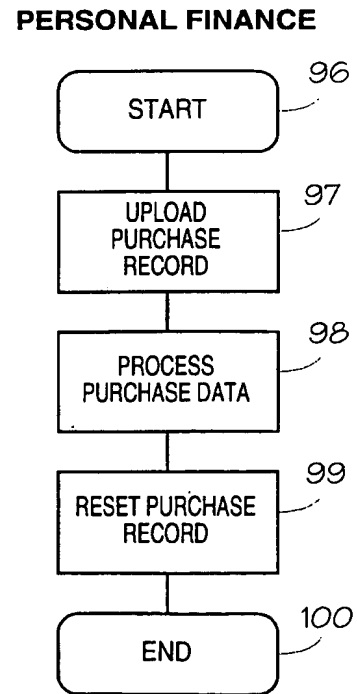
66	63	64	68	69
123412	"CROWN" BREAD	BREAD	1	1.30
234516	"ABC" LOW-FAT MILK	MILK	2	2.15
456798	"XYZ" LIQUID SOAP	SOAP	4	2.20
678123	BANANA	BANANA	1.25	2.50

FIG. 6E

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**MAIN PROCEDURE****FIG. 7A****PREPARE SHOPPING LIST****FIG. 7B****SPECIAL OFFERS AT CHECK-IN****FIG. 7C**

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**FIG. 7D****FIG. 7E****FIG. 7F**

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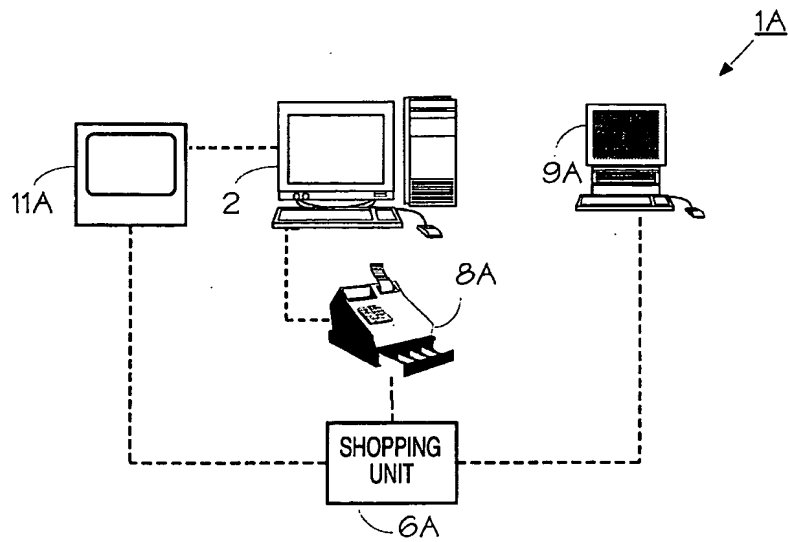


FIG. 8A

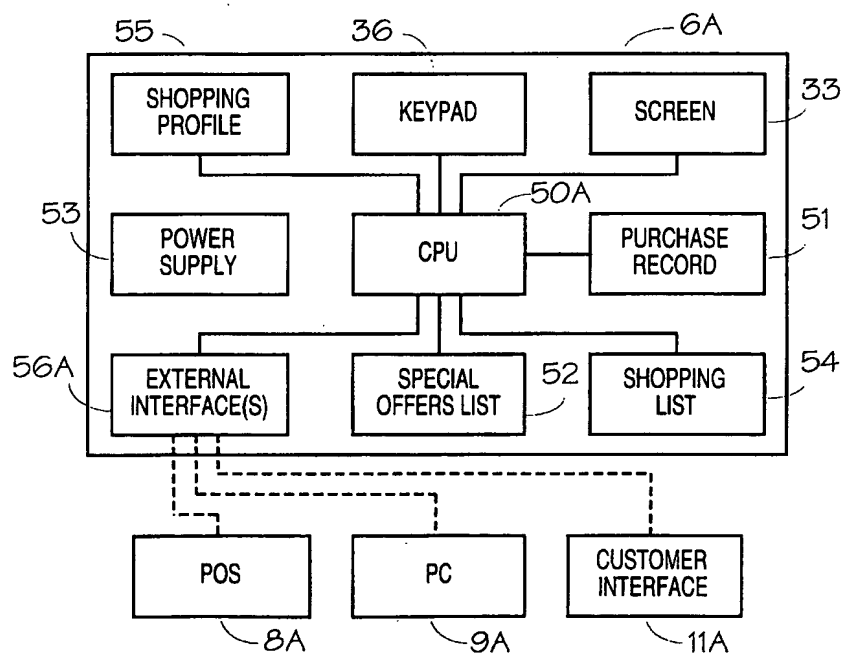
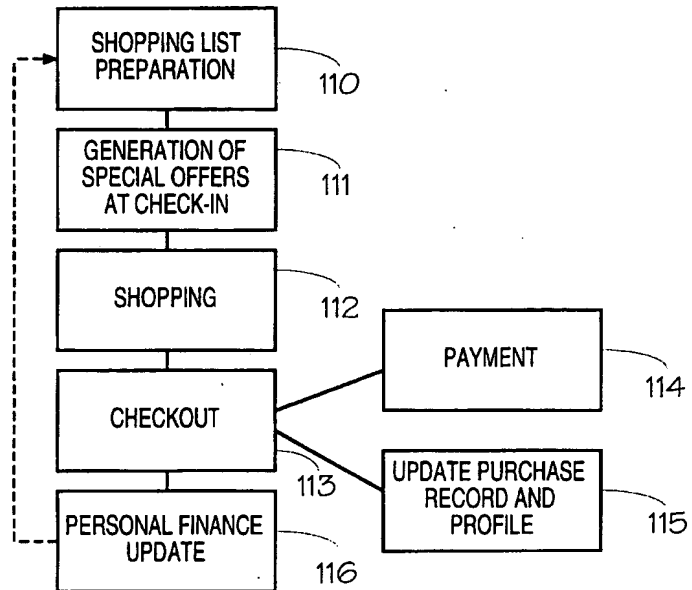


FIG. 8B

**MAIN PROCEDURE (2)****FIG. 8C**



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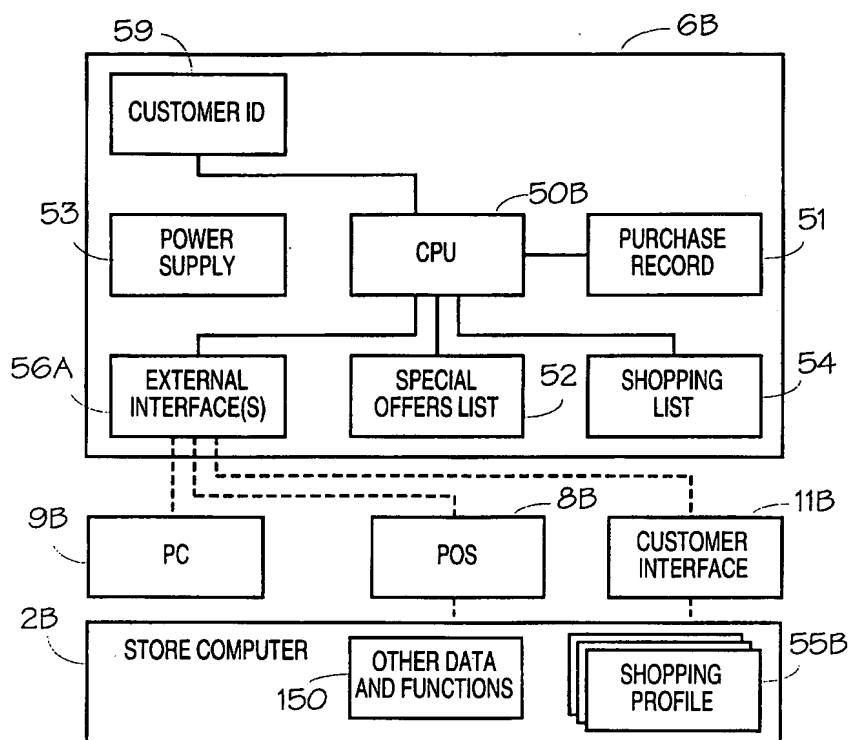


FIG. 9A

## MAIN PROCEDURE (3)

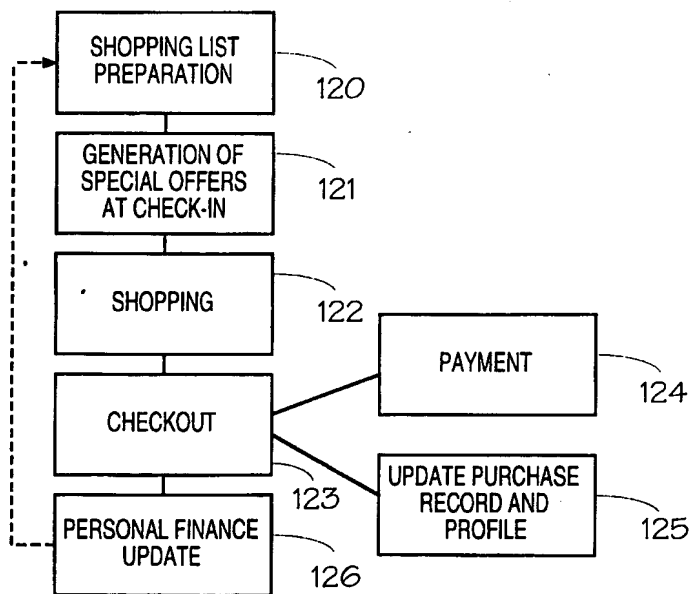


FIG. 9B

## INTERNATIONAL SEARCH REPORT

 International application No.  
 PCT/IL97/00339

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(6) : G06F 17/60, 17/40 US CL : 705/14, 16, 20, 21, 23; 235/383; 340/825.15 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 705/14, 16, 20, 21, 23; 235/383; 340/825.15 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) APS, Dialog		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,551,021 A (HARADA ET AL.) 27 August 1996, entire document.	1-3
Y	US 5,483,472 A (OVERMAN) 09 January 1996, abstract, columns 1 - 4.	4-8,12
Y	US 5,457,307 A (DUMONT) 10 October 1995, abstract, columns 2 - 6.	1,8,9,12,13
Y	US 5,424,524 A (RUPPERT ET AL.) 13 June 1995, abstract, columns 1 - 3.	1-9,12-14
Y	US 5,382,779 A (GUPTA) 17 January 1995, entire document.	1,10,11
Y	US 4,766,295 A (DAVIS ET AL.) 23 August 1988, abstract, columns 1 - 6.	1,10-12,14
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: *A* document defining the general state of the art which is not considered to be of particular relevance *B* earlier document published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *A* document member of the same patent family	
Date of the actual completion of the international search 01 FEBRUARY 1998		Date of mailing of the international search report 06 MAR 1998
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer Gail O. Hayes <i>Jon Bell</i> Telephone No. (703) 305-3711